

Application Number 10/540659
Response to the Office Action dated 01/22/2008

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REMARKS

Favorable reconsideration of this application is requested in view of the following remarks.

Claim 1-17 have been canceled without prejudice; new claims 18-29, which correspond to original claims 1 and 6-16, respectively, have been added following the Examiner's suggestions; added claims 19 and 22-29, which correspond to previous claims 6 and 9-16, respectively, have included no change of the language from that of claims 6 and 9-16; new claims 18, 20 and 21 have included changes from the previous claims 1, 7, and 8, respectively, as stated below; and the canceled original claims 2-5 and 17 have not been added as new claims.

Claims 18 and 21, which correspond to previous claims 1 and 8, have included limitations as supported by previous claims 1, 3 and 8 and the specification at page 6, lines 2-10 and 14-16 in addition to editorial changes.

Claim 20, which corresponds to previous claim 7, has been changed to specify the precursor that are polymerized as supported by the specification at page 5, lines 4-10; and page 6, lines 2-10.

Claim 24 includes a unit of weight percent as used to express concentrations in the specification (see, for example, page 10, lines 19-21).

Claims 1-17 have been objected to because of informalities. Claims 1-17 have been canceled and claims 18-29 have been added as stated above following the Examiner's suggestion. Therefore, the objection is moot and should be withdrawn.

Claims 1 and 3-7 have been rejected under 35 U.S.C. 102(b) as being anticipated by Peterson et al. (U.S. Patent No. 4,670,342). Applicants respectfully traverse this rejection.

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Applicants respond to this rejection as a rejection of claims 18-20 because previous claims 1 and 3-7 have been canceled as discussed above.

The present invention provides a transparent and colorless polyimide film based on a finding that a cyclic compound in a precursor of claim 18 prevents the film from discoloring when sintered at a high temperature because the compound has a larger dipole moment and dielectric constant than the polar organic solvent used for polymerization and has strong solvation due to a planar structure of the compound derived from the five-member ring and accordingly, the compound is substituted for the polar organic solvent (see page 5, line 22 – page 6, line 10; and the abstract).

Peterson discloses use of diamines such as p, p'-methylenedianiline (or occasionally called as p, p'-methylenedianiline) (MDA), p, p'-oxydianiline (ODA), and a general formula of H_2N-RNH_2 , wherein R is a divalent radical (see coln. 3, lines 33-37 and line 61). The formula 3 in claim 18 of the present invention is distinguished from MDA and ODA, and additionally, the general disclosure of H_2N-RNH_2 does not suggest the formula 3 compound that includes a SO_2 functional group. Therefore, the reference does not include diamines that claim 18 of the present invention requires.

In addition, the reference merely discloses use of propylene carbonate with other agents such as hydrocarbon solvent blend and N-methyl-2-pyrrolidone in order to yield a clear solution without describing any particular reason why propylene carbonate is used (see tables of Examples 1-5 and 17-18; coln. 4, lines 45-47; coln. 5, lines 13-15 and 56-57; coln. 6, lines 25-26 and 61-63; coln. 14, lines 50-52; and coln. 15, lines 22-24). Moreover, in order to yield a clear solution the reference substitutes a combination of propylene carbonate and hydrocarbon solvent blend (and N-methyl-2-pyrrolidone), which are used in Examples 1-5 and 17-18, for n-butanol and 28% NH_3 and H_2O in Examples 6-8 and 10-16 (see tables of Examples 6-8 and 10-16; coln. 7, lines 35-37; coln. 8, lines 3-5 and 42-44; coln. 9, lines 61-63; coln. 11, lines 2-4 and 49-51; coln. 12, lines 23-25 and 62-64; coln. 13, lines 38-40; and coln. 14, lines 12-14; and please note that NH in a table of Example 11 should be read to NH_3 .) or for only 28% NH_3 and H_2O (see table of Example 9 and coln. 9, lines 15-17). n-Butanol is not a cyclic compound, has no 5 member ring structure and does not include a carbonyl group, and the boiling point of n-

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butanol is 117 °C (see International Chemistry Safety Card, ICSC, attached hereto), which is not 200 °C or higher. In contrast, claim 18 of the present invention requires these properties because the compounds having such properties have a larger dipole moment and dielectric constant than polar organic solvents used for polymerization, have strong solvation with polyamic acid, are substituted for the polar organic solvent, and prevent discoloration of a film when sintered at high temperature (see page 6, lines 2-10 of the specification). Thus, the reference does not teach or suggest specific cyclic compounds that are used in the polyimide precursor liquid composition together with specific tetracarboxylic dianhydride and diamine and for manufacturing thereof as claim 18 requires.

Moreover, Peterson merely list formula 2 compound (BPADA) with various aromatic dianhydrides (see coln. 3, 26-31) and disclose use of propylene carbonate in examples as discussed above. However, the reference does not disclose use of a specific combination of formula 2 compound and propylene carbonate in addition that the reference does not disclose use of formula 3 compound as discussed above although a combination of formulae 1 and/or 2 compound, formula 3 compound, and a cyclic compound such as propylene carbonate claim 18 of the present invention requires in order to obtain the transparent and colorless film.

Therefore, claim 18 is distinguished from Peterson, and accordingly, the rejection should be withdrawn.

Claims 1-5 and 7-17 have been rejected under 35 U.S.C. 102(b) as being anticipated by Nishikawa et al. (Japanese Patent Application Publication No. 2001-264771). Applicants respectfully traverse this rejection.

Applicants respond to this rejection as a rejection of claims 18 and 20-29 because previous claims 1-5 and 7-17 have been canceled as discussed above.

Nishikawa merely lists formula 2 compound with various tetracarboxylic acid dianhydride compounds and formula 3 compound with various diamine compounds (see paras. 0005-0007) but does not disclose use of a specific combination of formulae 2 and 3 compounds together with γ -butyrolactone. As discussed above, in the invention of

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claims 18 and 21, a combination of formulae 1 and/or 2 compound, formula 3 compound, and a cyclic compound such as γ -butyrolactone is needed to provide the transparent and colorless film. In addition, the reference does not teach or suggest that γ -butyrolactone is selected because of its properties such as being a cyclic compound, having five-member ring-structure and a carbonyl group, and having the boiling point at 200 °C or higher that claims 18 and 21 of the present invention require in order to prevent discoloration of the film as discussed above. Instead, the reference discloses that any solvent that can dissolve polyamic acid can be used (see para. 0011). Therefore, claims 18 and 21 are distinguished from Nishikawa, and accordingly, the rejection should be withdrawn.

Claims 1-5 and 7-17 have been rejected under 35 U.S.C. 102(e) as being anticipated by Rushkin et al. (U.S. Patent Application Publication No. 2004/0161619). Applicants respectfully traverse this rejection.

Applicants respond to this rejection as a rejection of claims 18 and 20-29 because previous claims 1-5 and 7-17 have been canceled as discussed above.

Rushkin merely lists formula 2 compound with various tetracarboxylic acid dianhydride compounds and formula 3 compound with various diamine compounds (see paras. 0031-0035 and 0040) but does not disclose use of a specific combination of formulae 2 and 3 compounds with γ -butyrolactone that claims 18 and 21 require. In addition, the reference does not teach or suggest that γ -butyrolactone is selected because of its properties required by claims 18 and 21, but discloses that γ -butyrolactone is selected because it is a weaker polar solvent than dimethyl acetamide and N-methylpyrrolidone (see paras. 0009-0010).

Although this is not relevant to the reduction of discoloration that the invention of claims 18 and 20-29 achieves, N-methylpyrrolidone, which is prohibited in the reference (see para. 0009), in fact, can be used as a solvent required by claims 18 and 21 of the present invention.

Accordingly, claims 18 and 21 are distinguished from Rushkin. Therefore, the rejection should be withdrawn.

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Claim 7 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection.

Applicants respond to this rejection as a rejection of claims 20 because previous claim 7 has been canceled and corresponding claim 20 has been added as discussed above.

Claim 20 has been changed from original claim 7 to specify the precursor that is polymerized. The polyamic acid is converted to polyimide by chemical or thermal treatment (see page 11, lines 4-6 and 10-17). Accordingly, the polymerizing precursor polyamic acid is different from polyimide. Therefore, claim 20 is definite, and the rejection should be withdrawn.

Claim 11 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Applicants respectfully traverse this rejection.

Applicants respond to this rejection as a rejection of claims 24 because previous claim 11 has been canceled and added as claim 24 as discussed above. Claim 24 includes a unit of weight percent. Therefore, this claim is definite, and accordingly, the rejection should be withdrawn.

In view of the above, Applicants request reconsideration of the application in the form of a Notice of Allowance.

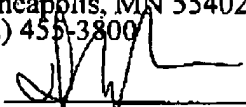


Dated: May 13, 2008

DPM/my/ad

Respectfully submitted,





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1-BUTANOL		ICSC: 0111	
Date of Peer Review: April 2005 n-Butanol n-Butyl alcohol Propyl carbinol Butan-1-ol Butyl alcohol			
CAS #	71-36-3	$C_4H_{10}O$ / $CH_3(CH_2)_3OH$	
RTECS #	EO1400000	Molecular mass: 74.1	
UN #	1120		
EC #	603-004-00-6		
TYPES OF HAZARD / EXPOSURE	ACUTE HAZARDS / SYMPTOMS	PREVENTION	FIRST AID / FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 29°C explosive vapour/air mixtures may be formed.	Above 29°C use a closed system, ventilation, and explosion-proof electrical equipment.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
Inhalation	Cough. Sore throat. Headache. Dizziness. Drowsiness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest.
Skin	Redness. Pain. Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Drowsiness. Dizziness. Nausea. Diarrhoea. Vomiting	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		PACKAGING & LABELLING	

Personal protection: filter respirator for organic gases and vapours. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Wash away remainder with plenty of water.		EU Classification Symbol: Xn R: 10-22-37/38-41-67 S: (2-)-7/9-13-26-37/39-46 UN Classification UN Hazard Class: 3 UN Pack Group: III	
EMERGENCY RESPONSE		STORAGE	
Transport Emergency Card: TEC (R)-30S1120-III NFPA Code: H1; F3; R0;		Fireproof. Separated from strong oxidants, aluminium.	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;"> IPCS <small>International Programme on Chemical Safety</small> </div> <div style="text-align: center;">     </div> <div style="text-align: right;"> Prepared in the context of cooperation between the International Programme on Chemical Safety and the Commission of the European Communities © IPCS, CEC 1999 SEE IMPORTANT INFORMATION ON BACK </div> </div>			

1-BUTANOL		ICSC: 0111
IMPORTANT DATA		
<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p>CHEMICAL DANGERS: Reacts with aluminium when heated to 100°C, strong oxidants, such as chromium trioxide forming flammable/explosive gas (hydrogen - see ICSC0001). Attacks some forms of plastic, rubber and coatings.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 20 ppm as TWA; (ACGIH 2005). MAK: 100 ppm, 310 mg/m³; Peak limitation category: I (1); Pregnancy risk group: C; (DFG 2004).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the skin, and is severely irritating to the eyes. The vapour is irritating to the eyes and the respiratory tract. Exposure far above the OEL could cause lowering of consciousness. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The liquid defats the skin.</p>	
PHYSICAL PROPERTIES		
<p>Boiling point: 117°C Melting point: -90°C Relative density (water = 1): 0.81 Solubility in water, g/100 ml at 20°C: 7.7 Vapour pressure, kPa at 20°C: 0.58 Relative vapour density (air = 1): 2.6</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 29°C c.c. Auto-ignition temperature: 345°C Explosive limits, vol% in air: 1.4-11.3 Octanol/water partition coefficient as log Pow: 0.9</p>	
ENVIRONMENTAL DATA		
NOTES		
ADDITIONAL INFORMATION		
LEGAL NOTICE	Neither the CEC nor the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information	
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See Also:
Toxicological Abbreviations